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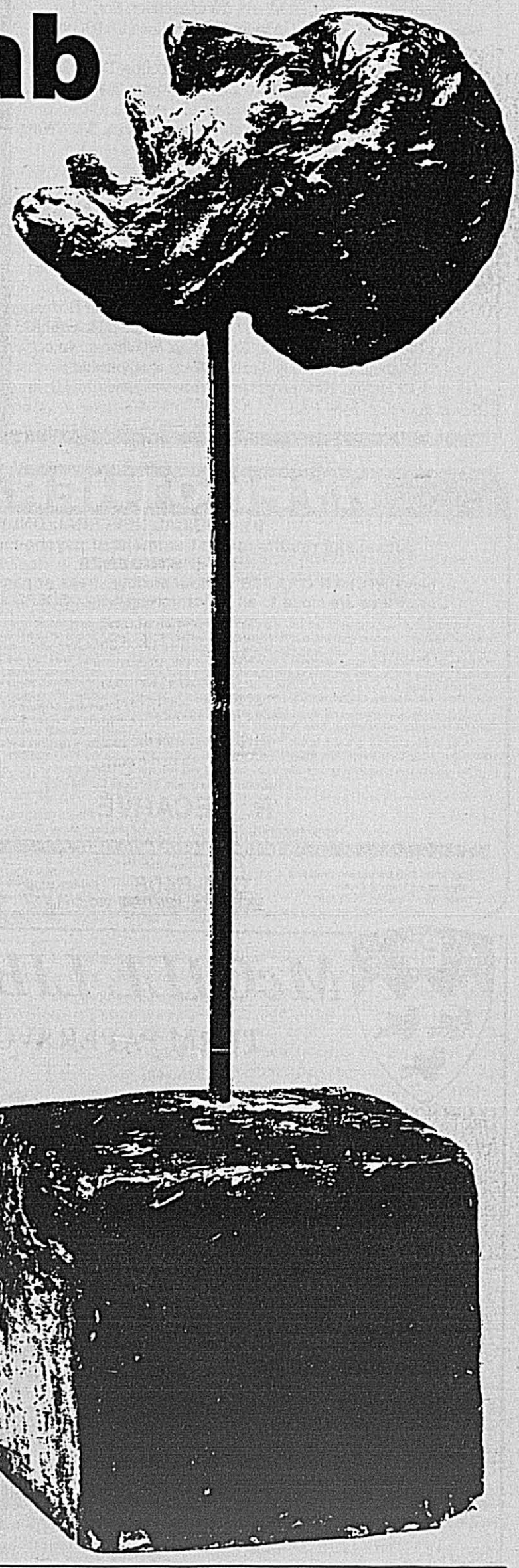
Gift of the gab



In the fifth century B.C., the Egyptian Pharoah Psammetichus brought two infants and a servant to a remote mountain hut. The servant had orders never to speak in the infants' presence. Legend has it that the first word the children uttered was 'bekos', meaning bread in Phrygian. It was thought, on this basis, that Phrygian, an ancient language spoken in a region of present day Turkey, was the original human tongue.

However farfetched the Pharoah's theory may seem, we are not now much closer than Psammeticus to discovering the first language or languages.

BY TARA PATEL

Today it is generally accepted that humanity originated in many different parts of the world. From their diverse protolanguages, modern language families developed.

But what was the driving force that caused humans to use complex forms of communication? Though opinions are not lacking, the mystery has yet to be solved.

Greek naturalists saw a strong connection between language and the essence of nature. They believed onomatopoeia was the driving force behind the creation of language. In onomatopoeic speech, sound imitates meaning, as exemplified by the ubiquitous 'bubbling brook'.

In the mid-eighteenth century, philosopher Jean Jacques Rousseau theorized that humans first uttered 'cries of nature'. Rousseau, a founder of the Romantic movement, thought language was originally ejaculations of pain, fear, pleasure and anger.

Sir Richard Paget argued, two hundred years later, that the oral movement one makes to speak replaced gestures.

The Soviet aphasiologist A. R. Luria accepted in 1970 the view that the grunting of men working together was the origin of language.

Last but not least is the theory of Otto Jespersen. He proposed that language originated from song, out of a need to express love, rather than merely to communicate.

Scholars are also concerned with how the development of language relates to the evolution of humankind. Again opinions vary considerably.

The renowned linguist Noam Chomsky, of the Massachusetts Institute of Technology, is the father of generative linguistics. He thinks that a child has the capacity to speak innately. In other words, humans were preprogrammed to speak, whereas animals were not.

Chomsky believes the human language organ, a module in the brain, is unique to our species. He argues that this organ appeared solely and suddenly in humans.

Philip Liebermann, a professor of cognitive and linguistic sciences at Brown University, strongly disagrees with the theories of Chomsky.

Liebermann, the author of The Biology and Evolution of Language, thinks modern man can speak because of evolution, and that this can be proven. He links the development of language to the evolutionary development of the necessary anatomical organs, namely, brain cells and throat muscles.

In the 1950s and 1960s, Hasking Laboratories in New York make the first attempt to develop a machine that reads books to blind people. A startling discovery about linguistic ability was made. A human listener cannot keep track of a tapping sound greater than nine taps per second. Fifteen taps per second is perceived as a buzz. In contrast, a short sentence can be said in two seconds, contains approximately 50 sounds and is easily understood.

Humans encode phonetic sounds so a lot of information can be transmitted within the range of short term memory. Only the mature human vocal apparatus can make the entire range of necessary sounds.

Apes and human infants under the age of three months are physically incapable of producing the complete range. Their voiceboxes are located too high in the throat. With the retreat of the infant's voicebox, or larynx, into the throat during growth comes the ability to speak.

Unfortunately, with this ability, humans increase their chances of choking. Food and drink must pass over the opening to the lungs in the human throat. Because of their high voiceboxes, animals can breath and eat at the same time. Food passes around their air passages.

Why then did evolution put us in such a precarious predicament? According to Liebermann, during the course of evolution, conditions favoured our development of vocal communication. It all boils down to the principles of Charles Darwin.

Darwin's theory of evolution states that only the fittest survive. We cannot run quickly, nor can we see or hear very acutely. Vocal communication was thus very important to prehistoric man. Warnings of danger and signalling to potential mates had to be understood. While animals such as horses have much greater respiration efficiency, and thus better running ability, humans have the strategic advantage of speedy communication.

Over time the human tongue also descended into the throat, the jaw became smaller and the number of teeth fewer. We not only became less suited to breathe, but also to eat. The only plausible reason, according to Liebermann, was to facilitate speech.

The development of the throat and tongue was not, however, the most important step in the origin of language. According to computer

continued on page 7

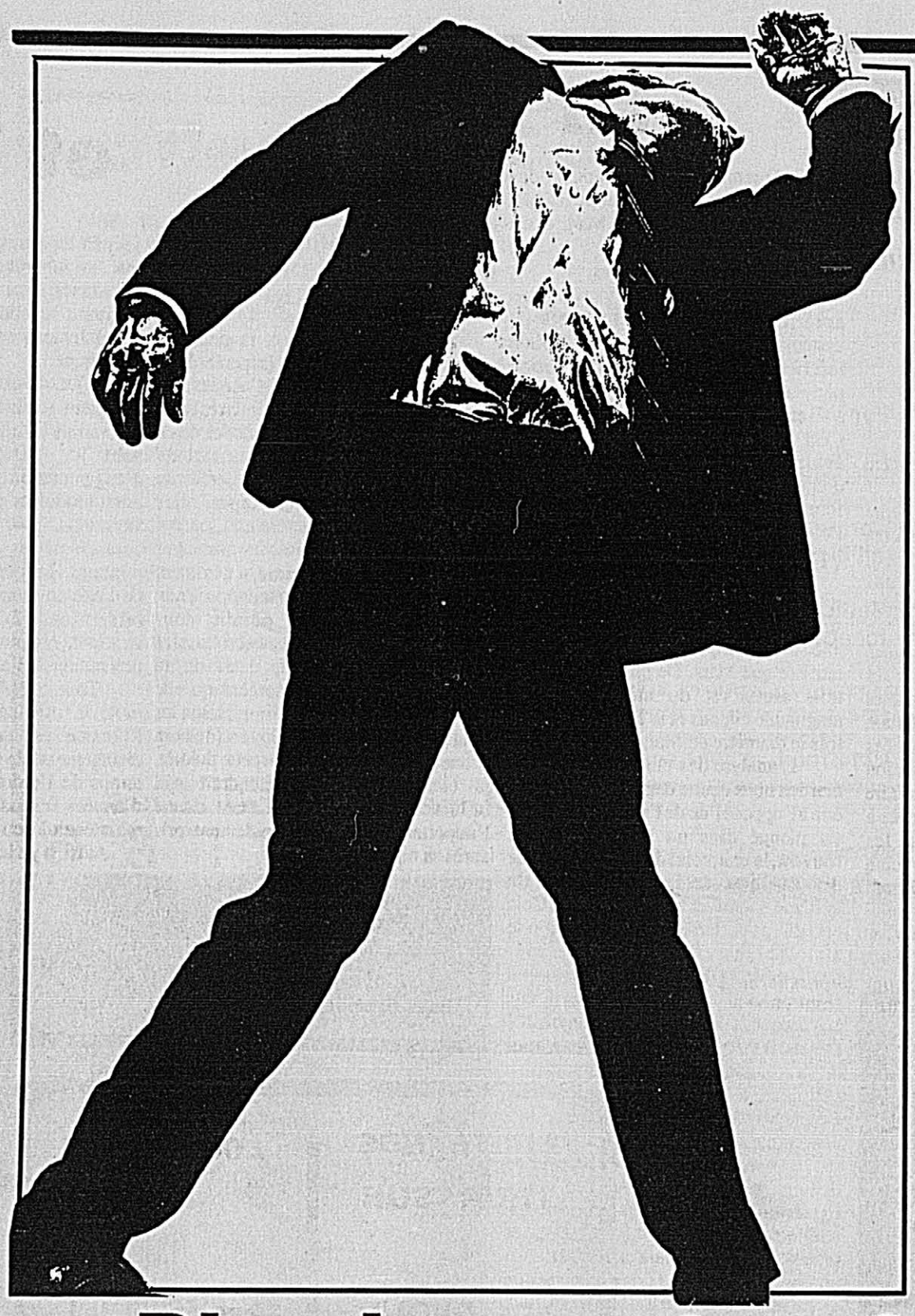
INSIDE

EVENTS

Red Herring: Humor Magazine meeting, Union 310. 18h00-20h00.
Groupe de Discussion Femmes Homosexuelles: Thémes differents. Tous les mardis, 19h00-21h00 . Le Centre des Femmes du Plateau Mont-Royal,5148 Berri, Métro Laurier, Sortie Est. Renseignements: 273-7412, 526-5477 Micheline (17h00-19h00)

Folk Music Society: Every Tuesday at The Yellow Door, 3625 Aylmer, 19h30. Informal gatherings, bring voices, guitars, etc. 284-7828
Save the Children: Meeting, Royal Victoria College, West Wing, 7:30 p.m.
Theological College, 3473 University
Le Départment de langue et litterature francaises de l'Université McGill: Un Colloque international sur Le Moyen Français "Du Manuscript à l'imprimé." Sous les auspices de la Société des Etudes Mediévales du Québec et de la revue Le Moyen Français. Pavillon Peterson, 3460 rue McTavish. Renseignements: Prof. G. DiStefano, 378-6892.
Women's Union: Discussion: Images of Ourselves: Our Bodies and Self-Identity;How do we Feel? 16h30 in Union 423. 398-6823
Project Ploughshares: Fuel Air Explosives: So what are you going to do about it?. Planing meeting of the Responsible Research Committe. New people more than welcome. 16h00 in Newman Centre, 3484 Peel

IF KIM FAILS SPECIAL REL. IT'S 'CAUSE OF WHAT YOU'RE READING NOW



Society still at large!

by Arnie Mooers

Dr. John Polanyi, Canada's most recent Nobel prize winner in chemistry and pre-eminent peace activist, spoke last Wednesday at Concordia University. His talk concentrated on the social responsibility carried by scientists and its potentially antagonistic interaction with the role of researcher. Polanyi believes scientists face a duality of responsibility—to their craft and to society and both must be served if the species is to survive.

According to Polanyi, a scientist has a primary responsibility to science, to "truth and objectivity". Science, the laureate believes, is the "greatest glory of our civilization" in this century. Scientists must therefore not be apologetic about their craft. Unfortunately, while most scientists take this stand, there remains an ethical problem. Scientists must reconcile the "pursuit of glory" with "loftier committment to dispassion."

Polanyi addressed some of the ethical problems facing scientists. After citing purely personal motives and fear of peers, he turned to political pressure. According to Polanyi, scientists must tell little 'white' lies about the immediate social relevance of their work in order to get government funding. Government policy then is to perpetuate and strengthen the ties that bind research to specific short-term goals. Truly fundamental research is compromised by the very scientists who perform it, as "they push the packaging and not the contents." Scientists are not in this case being resposible to their craft.

Polanyi emphasizes the scientist's responsibility to society. Humanity's present predicament, and it's future health and prosperity, are dependent upon and bound to science. Consequently, there is a tendency to 'expect' science to follow only benign paths. Some believe, Polanyi maintains, that scientists should police themselves and that they should produce only 'good' science. This could be achieved by slowing down science, to 'keep things in hand'.

But Polanyi dismissed this notion, scoffing at the concept of "blindfolding" mankind. "Our most powerful mode of thinking would be stifled," he said.

The second option suggested was the suppression of only certain contentious areas of science by the scientific community itself. Polanyi believes this would serve no purpose because of the necessarily expansive nature of science. The void produced by banning nuclear research, for example, would quickly be filled, in a military context, with increased chemical, laser, or biological weapons research.

Polanyi argued scientists should not even try to police themselves. "No minority should unilaterally try to coerce the majority," he said. It would be arrogant to assume the scientists knew better.

According to Polanyi, it is not science that is at fault but society at large. He encouraged individual political pressure. He referred to the initiative that he and 20 000 other scientists around the globe had taken to publically declare themselves against S.D.I. (Star Wars). This was a political "gesture". "No one believes S.D.I. will fail because I'm not working on it," Dr. Polanyi quipped, but, acting as individuals, these scientists are capable of effecting a strong stance.

Society at large can and should blame the scientific community for not taking part as individuals in the larger political sphere, Polanyi said. Scientists must become politically active; it is their reponsibility to the society which has given them the priviledge of education and a measure of respect. They must, however, function in public office not as 'scientists' or experts in some arcane field, but as individuals aware of the problems, both literate and skeptical. As science plays a larger role in our lives, this quality is indispensible.

Blood, sweat and Oracle

by Caitlin Huckell

Why do some people faint when they give blood?

Fainting is the result of a rapid fall in blood pressure. The reaction is an incredibly simple one. Because of fatigue, off-kilter blood sugar levels, or the remnants of last night's outing, some people experience a 'Vagel' reaction. (Who Vagel was is still one of Biology's great mysteries.)

The reaction is simply the simultaneous dilation of a majority of the capillaries. Blood pressure drops, depriving the brain of oxygen. As a result, the brain finds itself momentarily unable to function, and the blood donor faints. The blood pressure has usually returned to normal long before most bystanders are mouthing worlds of sympathy and maternal advice.

What does blood pressure actually mean?

Just to be technical, blood pressure is a measure of the force per unit area with which blood pushes against the walls of the blood vessels. Normal blood pressure is supposed to fall around 120/80.

This means that when the ventricles of the heart are contracting, a force that could push 120 millimeters of mercury up the column is present. The 80 relates to the same thing, except that it is the force of the ventricles relaxing. The contraction is called the systolic blood pressure, and the relaxation is the diastolic pressure.

What are blood types?

Blood types arise because of different antigens on the blood cells. Through testing of these antigens, four major blood types were discovered: A, B, AB and O.

Transfusions only became safe around the turn of the century. Before then the concept of different people having different blood types was difficult to grasp. If you had a transfusion back then, you were more likely to die than to regain your health.

But thanks to some historical hardheads, transfusions can be safely performed today. People with A blood can receive from other As or Os. Those with B can use B or O. ABs are the luckiest of all—they can use all four types. People with O are called universal donors because their blood is useful to everyone. But the favour is not returned—they can only receive blood from other Os. Luckily, O type blood is the most common of all.

P.S.—Obscure historical name: Karl Landsteiner provided the basis for blood typing. Thrill your friends, your family and small rodents.

Once the nurse yanks out the needle, where does my blood go?

Contrary to the impression one gets from General Hospital, your blood does not remain in that little plastic bag. It's taken to a centrifuge and spun so that the various components separate. Preservatives are added, and each component is stored.

Some parts convert into powders that are easy to store—they can sit in the cupboard next to the empty Oreo box. Others need tender loving care and have to be deep frozen, just like last January's pork chops. When blood is needed, the vital components are recombined with an artificial plasma-like liquid. It's your basic just-add-water-and-stir recipe.

La Terre et Vé

Fontenelle, il y a trois siècles, faisait de Vénus un Eden où s'ébattaient, au milieu des danses et des fêtes, Philémon et Baucis. Swendenborg, un siècle plus tard, vantait les charmes des belles vénusiennes se promenant sans voile dans des paysages enchanteurs.

MARC SOKOLOWSKI

En fait, l'épaisse couche de nuages qui recouvre en permanence la planète a longtemps dissimulé la vérité aux humains : Vénus n'est pas un paradis mais un enfer! La température au sol, de jour comme de nuit, de l'équateur aux pôles, tourne autour de 460°C, et la pression de l'air, composé presque uniquement de gaz carbonique, et chargé de minerais toxiques mélangés à des ralents acides émanant des nuages, atteint 90 atmosphères.

Ainsi l'étoile du berger semble avoir peu de points communs avec la Terre. Pourtant, la compilation des informations retransmises par plus de 15 sondes envoyés sur notre plus proche voisine dresse une effroyable liste de similarités entre les deux astres, et il semble bien que notre planète soit sur le point d'entamer, avec quelques milliards d'années de décalage, la même sinistre métamorphose que la deuxième planète du système solaire.

Notre connaissance du système solaire interne (toutes les planètes jusqu'a Mars, en partant du soleil), surtout avec l'avénement des observations in situ par des sondes spatiales, nous dresse désormais un portrait suffisamment précis des voisines de la Terre pour pouvoir comparer les caractéristiques de toutes ces planètes dans une perspective globale, en tenant compte des nuances normales apportées par exemple par leur lieux de formation différents au sein de la nébuleuse solaire primitive. Ainsi sommes nous amenés à comparer la météorologie et les caractéristiques géologiques des cinq planètes telluriques. Deux groupes sont ainsi à définir. Le premier est celui regroupant Mercure et la Lune, qui n'ont pas d'atmosphére et sont géologiquement morts depuis des milliards d'années, quand au deuxième, il contient la Terre, Vénus et Mars. C'est celui qui nous intéresse.

Planètes de contrastes

Ce qui regroupe avant tout ces trois astres, c'est leur proximité à l'échelle du système solaire : Vénus, en conjonction inférieure, et Mars, en opposition périphélique, se trouvent respectivement à 40 et 56 millions de kilomètres de nous. Cela place ces 2 planètes (et la Lune, évidement) dans la zone possible d'émergence de la vie, car c'est dans cette fourchette de distances de la Terre que l'on peut encore trouver de l'eau à l'état liquide.

Ainsi la quantité de rayonnement solaire reçue par Vénus est de deux fois supérieure à celle reçue sur la Terre, qui elle même reçoit deux fois plus de lumière que Mars. De plus, la taille des trois astres est du même ordre de magnitude (Vénus et la Terre ayant deux fois le diamètre de Mars).

L'analyse des climats vénusien et martien nous donne deux portraits, peut-être à l'opposé l'un de l'autre. Ainsi Mars est plongé dans un froid qui rejoint souvent, la nuit, celui de la torpeur glacée des satellites des géants gazeux du système solaire externe (-120° C). Cela est dû à la faible influence d'une atmosphère, qui bien que non-négligeable (1/150ème de la pression atmosphérique au sol), n'en a pas moins des capacités de retention thermique très faibles. Il est cependant à noter qu'à midi et à l'équateur, une température supérieure à 10° C a pu être enregistrée. De l'autre côté, on retrouve Vénus et ses conditions infernales déja signalées.

La terre semble alors se retrouver au milieu géométrique de ces deux extrémités, avec des conditions tempérées et un climat varié. Les planétologues attribuent cette situation à un ensemble de conditions uniques que de par leur interactions au bon moment et au bon endroit, permirent à la météorologie terrestre de se maintenir, surtout lors de la naissance de notre planète, en équlibre sur un fil de rasoir. En effet, si la Terre se serait formée à une distance en deça de 0,96 unités astronomiques, elle aurait immédiatement connue le sort de Vénus. (Des projections donnent une température au sol de trois cent degrés centigrades sous une pression de l'air de soixante atmosphères, avec une composition « Vénusienne », c'est à dire le triplet gaz carbonique-acide sulfurique-métaux toxiques), alors qu'une formation au-delà de 1.02 U.A. l'aurait recouverte de glaces.

Par exemple, l'effet de serre terrestre a duré suffisament de temps pour compenser la faible luminosité du jeune soleil (de 25% inférieure à celle rayonnée aujourd'hui), ce qui a permis aux roches de fixer le gaz carbonique, responsable en partie de cet effet de serre, alors que le soleil prenait la relève en augmentant peu à peu sa luminosité. La vie aussi apparut, et réduisit aussi la concentration de gaz carbonique atmosphèrique par photosynthèse (Ce fut littéralement une « pollution » par l'oxygène). Nous savons aussi que la capacité de fixation du gaz carbonique par les roches basaltiques nécessite des conditions très particulières (marge de température de quelques degrés centigrades, marge de pression atmosphérique tout aussi étroite, etc.).

L'hypothèse 'Gaya'

Comble de chance, la présence d'une Lune toute proche (séparée de la Terre, il y a trois milliards d'années, par moins de trois cent mille kilomètres) créa des marées de forte amplitude, et de ce fait augmenta les concentrations biologiques près des côtes (colonies de stromalithes et autres organismes primitifs, qui se regroupèrent là, car ces zones possédaient à la fois les avantages de la mer et de la terre ferme, notamment une luminosité accrue par rapport aux fonds marins). Cela permit non-seulement à la vie de se lancer à l'assaut de la terre ferme, mais aussi de se multiplier d'une telle manière qu'elle aurait pris le contrôle de climat, selon les tenants de l'hypothèse « Gaya » (du nom d'une déesse Hindou, selon cette théorie, la biosphère terrestre étendrait son influence jusqu'au climat étant donné l'importance qu'elle a rapidement pris après sa naissance).

Et évidement, j'en pas pas les innombrables déta l'existance de la couche d'o montrant quelle chance probablement eue dans so climatique.

Aujourd'hui, les conditi entourent semblent stables. des variations minimes appa sont les périodes de d'augmentation de tempér aussi modulées par leurs pr variations. Tout cela a dive notamment les variations, minimes, dans la valeur de l de l'axe de rotation de la T orbite, de l'excentricité terrestre, et des variatio précession de l'axe de rotati

Tout ces phénomènes mot, le millénaire comm l'homme est en train d' changements de même ampl temps de l'ordre de quelqu d'années, fracassant par là l'é maintenait à peu près stable

Ainsi, il y a le gaz carbon

L'effet de serre

NATHALIE RAGHEB

Chaleurs torrides, grandes sécheresses, zones sinistrées... On parle de plus en plus des changements climatiques, conséquence directe de l'effet de serre. On parle de plus en plus de ce monde chaud et sec qui accueillera nos enfants, peut-être nos petits-enfants. On parle de plus en plus d'une sous-alimentation mondiale, menaçante et proche. On parle de plus en plus, mais quand agira-t-on?

Les grands bavards de ce monde constatent avec émoi que l'accumulation dans l'atmosphère de gaz dits « radiatiques » forme une couche dont l'effet rappelle celui d'une serre. Les rayons du soleil qui, en temps normal, regagnent l'espace après avoir touché la terre, sont maintenus prisonniers de l'atmosphère. Sous le grand chapiteau, la surface de la terre se réchauffe progressivement. *Environnement Canada* prévoit que d'ici 50 ans la température moyenne mondiale aura augmenté d'environ 1,5 à 4,5°C.

Les gaz coupables, les gaz de l'effet de serre, proviennent en grande partie des activités de notre vie courante : le gaz carbonique naît entre autre de l'utilisation de mazout, de gaz naturel (chauffage) et d'essence (transport); les CFC (chlorofluorocarbones) sont la conséquence des isolants, des fluides de refroidissement dans les réfrigérateurs et des bombes aérosol; l'ozone nocif surgit des tuyaux d'échappement des voitures.

Si l'on se fie aux statistiques, les changements de température de ces dernières années sont tout à fait normaux. Mais certains savants s'inquiètent déjà au sujet des transformations. De grandes zones sinistrées dans l'ouest canadien résultent de la sécheresse. Les étés longs et chauds, les deux mois d'enfer, se succèdent, de moins en moins supportables.

En septembre 1987, les géants de ce monde, ceux qui tiennent notre sort entre leurs mains, signaient le Protocole de Montréal, qui prévoit une forte règlementation et des mesures de contrôle de la pollution atmosphérique. Ils désiraient ainsi obliger une diminution de l'émission des substances nocives et rétablir, dans la mesure du possible, l'ordre naturel des choses. Mais ce protocole n'est pas encore entré en vigueur. On prévoit que des actions concrètes débuteront le 1er janvier 1989, « date *anticipée* de l'entrée en vigueur » selon *Environnement Canada*.

En attendant, on se tait. Plus rien n'est mentionné au sujet du Protocole. On attend. Si aucun mécanisme ne se met en branle au jour de l'an prochain, bien minces sont les chances d'une action future... et c'est à prévoir.

Les Grands ont parlé et nous, faute de voir et d'entendre, nous nous taisons. Les médias commencent déjà à nous endormir. Cet été, un journaliste averti nous conseillait de nous habituer aux températures extrêmes, suggérant ainsi qu'on ne pouvait enrayer l'effet de nos déchets. Evidemment, ces paroles encourageantes incitent à ne rien faire et à laisser les choses se détériorer.

Un programme de sensibilisation plus efficace jumelé à une intervention gouvernementale s'imposent donc.

...nus: des soeurs jumelles

...se, ne citant ...ils (comme ...ozone, etc...) ...la Terre a ...n évolution ...ons qui nous ... Evidement, ...raissent. Ce ...glaciation, ...rature, elles ...ropres mini- ...rses causes, ... elles aussi ...l'inclinaison ...erre sur son ... de l'orbite ...ns dans la ...on terrestre. ... ont, au bas ...e unité. Or ...induire des ...litude en des ...ues dizaines ...équilibre qui ... le climat. ...ique dont on parle désormais tant, parce que sa libération massive, (ou plutôt sa remise en libérté) dans l'atmosphère avec d'autres composés ayant les mêmes propriétés, tels que les BPC et le méthane, risque, par effet de serre, de faire grimper la température moyenne de l'air de trois degrés centrigrades (neuf degrés aux poles).

Ravages écologiques

Evidement, certains contestent le portrait pessimiste de la situation climatique future, en affirmant qu'au secondaire (-220 à -60 millions d'années), la concentration de gaz carbonique atteignait facilement 5%. Ainsi, les végétaux pourraient profiter de l'augmentation du CO_2 pour améliorer leur rendement productif (la chlorophile atteint justement l'apogée de son efficacité avec une concentration de gaz carbonique variant de cinq à six pourcents), se multiplier, et par là atténuer la concentration en dioxide de carbone. De plus, la mer peut absorber le dioxide de carbone qui y est facilement soluble (c'est d'ailleurs au travers de l'eau, en formant l'acide carbonique, que ce gaz s'est fixé dans ce que l'on nomme les roches carbonées). Ainsi pourraient exister des mécanismes régulateurs, qui en fonctionnant d'ailleurs en permanence, ont maintenu la stabilité climatique pendant des centaines de millions, voire des milliards d'années.

Mais ce que l'on oublie, c'est l'ampleur des ravages écologiques qui s'abattent sur les plantes et autres métaphytes, et surtout leur rapidité.

Ainsi, la forêt amazonnienne n'existera plus au début du prochain millénaire, tout comme les autres forêts tropicales (et les autres forêts tout court : il y a quelques jours, on annonçait que les feux de forêts ont anéantis les deux tiers de la superficie du parc de Yellowstone aux Etats Unis). La pollution chimique, quand à elle, détruira la couche d'ozone, en acidifiant les pluies, etc.

La situation atteint donc un niveau catastrophique, car déjà les trois quarts de la surface terrestre sont recouverts d'eau, qui est assez faiblement concentrée en éléments organiques par rapport à la terre ferme, le reste est au deux tiers un désert, et la partie restante, celle considérée habitable, est attaquée de toute part par l'expansion humaine, qu'elle soit industrielle et/ou démographique.

L'homme, réinjectant l'énergie emmagasinée depuis des millions d'années (dans les combustibles fossiles) dans la biosphère est ainsi en train de déstabiliser le climat, principalement en renforçant l'effet de serre. C'est ainsi qu'un examen plus approfondi de la planète Vénus s'impose.

Jumelle de la terre

Vénus est géologiquement presque en tous points semblable à la Terre : les deux planètes ont presque le même diamètre (rayons respectifs de 6050 et 6370 kilomètres), la même composition, la même structure, la même gravité et la même densité.

La pression atmosphérique vénusienne est de 90 fois supérieure à celle de la Terre (c'est la pression que l'on rencontre à un kilomètre sous la mer). L'atmosphère est principalement composée de gaz carbonique (95%) avec comme constituants secondaires l'azote (4%) et presque tous les autres gaz à l'état de traces (0.005%) de vapeur d'eau). Sa température est partout supérieure à 460 degrés centigrades (de quoi liquéfier des métaux come le plomb, le zinc, et vaporiser presque tous les composés non-silicés que nous voyons autour de nous). Des couches uniformes de nuages et de brumes s'échelonnent entre 45 et 60 kilomètres d'altitude. Ces nuages ne sont pas formés de vapeurs d'eau, comme on l'a cru au début, mais de goutelettes d'acide sulfuriqure pur, qui se condense d'ailleurs en une pluie acide permanente entre 45 et 20 kilomètres du sol (et qui posa des problèmes évidents aux premières sondes, qui ne survécurent d'ailleurs pas jusqu'à leur arrivée au sol)

Ainsi, on frémira en apprenant que la Terre et Vénus ont la même quantité de gaz carbonique, et ont probablement connues une évolution géologique et climatique semblable pendant le premier milliards d'années du système solaire. Heureusement pour nous, 95% du CO_2 a été absorbé par la mer.

Evidement, l'Etoile du berger connaît certaines différences originelles avec notre planète, comme une valeur négligeable de l'inclinaison de son axe de rotation sur l'orbite (3 degrés) qui implique l'absence, même théorique, de saisons, (l'orbite vénusienne, dont le rayon vaut 70% de celle de la Terre, est d'ailleurs la moins elliptique dans le système solaire), et une inexplicable rotation inverse (particularité aussi

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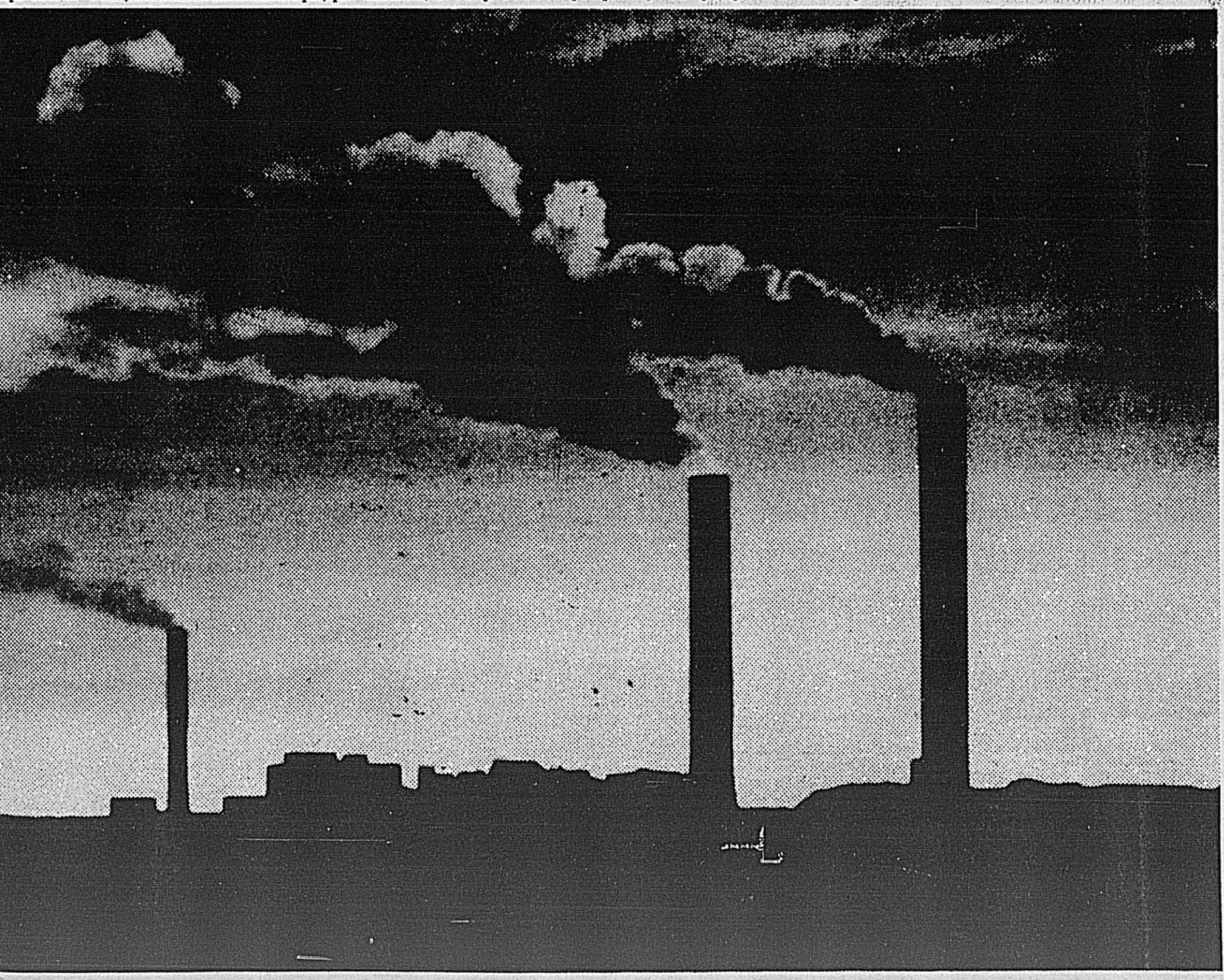

Dewdney's universe

by Chris Marshall

Dr. Dewdney, a professor at the University of Western Ontario, views himself as a theoretical computer scientist. For three years he has been writing a monthly column for Scientific American, "Computer Recreations," revealing to his readers fascinating aspects of his unique field. His latest book, *The Armchair Universe*,is a compilation of twenty-five of his articles written between 1984 and 1987.

The Armchair Universe is not a text, not something only accessible to computer science graduate students, and not the proverbial cure for insomnia. Rather, the book is an entertaining treatise on the theory behind computer science.

The author introduces his readers to specific subjects in an evocative and entertaining manner, opening up worlds that would very likely be closed to any but initiates of the discipline. Each chapter presents an innovative way of looking at the technological age in which we are inextricably bound, and appeals to two distinct levels.

On the one hand, it deals with the philosophy of computers. Explaining things in a lucid, conversational style, Dewdney introduces his readers to Mandelbrot sets, Golomb rulers, and other aspects of artificial intelligence. There is no requisite computer literacy with Dewdney, even though some of his articles deal explicitly with analog replacements for computers, as well as how the computer (and its programmer) accomodates for these limitations.

The second level of Dewdney's writing is for those who know their way around a computer. In dealing with the theoretical aspects of computer science, he often refers to special programs. For those with the interest, enough information is provided to help the reader write the programs on their own personal computers. He explains how to make an 'unbeatable' checkers program, how to calculate the value of pi by shooting cannonballs into a screen-based lake, and how to reproduce the movement of stellar clusters without leaving one's terminal.

Dewdney presents only the bare essentials of any such program, leaving the complexities of programming entirely to the programmer. The instructions given are seldom restricted to a particular language, allowing for programmer possibilities at any level of experience.

The purpose behind Dewdney's writing is to break down the distinction between the computer world and life. He describes voting theory and the nature of bank queues in term of on-screen applications, and gives the reader enough information to demonstrate the nature of the democratic process without having to leave the apartment.

continued on page 8

... La terre et Vénus

continued from page 5

valeur théorique, qui est de 15°C). En vérité, le gaz carbonique malgré son omniprésence, ne participe qu'à 55% de cet effet serre, le reste étant partagé entre les goutelettes d'acide sulfurique et la vapeur d'eau, qui semble pourtant briller par son absence, vu sa concentration quasi-homéopathique dans les couches nuageuses (elle est essentiellement formée par photodécomposition de l'acide sulfurique par les ultraviolets donnant aussi du bioxide de soufre). Ce réajustement est l'ocuvre de James Pollack, Carl Sagan et de leur équipe, qui ont construit un modèle de l'atmosphère vénusienne et qui ont présenté leur travaux au congrès de

Palo Alto concernant Vénus, en novembre 1981.

Un scénario étonnant

Si nous nous sommee attardés sur la vapeur d'eau, c'est qu'elle semble présenter un danger d'effet de serre bien plus important que le gaz carbonique.

En effet, certains experts présentent un scénario étonnant pour la deuxième planète du système solaire : à l'origine, Vénus possédait une très grande quantité d'eau. Etant plus proche du soleil, sa température devait osciller entre 40 et 60°C. Cela était suffisant pour produire une évaporation océanique intense avec formation d'épais nuages de vapeur d'eau. Cette vapeur d'eau, dissociée sous l'action du rayonnement ultra-violet, fut éliminée, l'oxygène redescendant au sol pour y être absorbé, et l'hydrogène s'échappant dans l'espace.

Ainsi, un premier effet de serre

provoqué par l'énorme nappe de vapeur d'eau, avait porté la pression au sol à 400 atmosphères et la température à 1500 degrés centigrades, transformant la surface de vénus en une vaste mer de magma en fusion, où était du même coups favorisé l'absorption de l'oxygène. Après quelques 250 millions d'années, la surface a commencé à se refroidir, pour finalement se stabiliser aux (accueillantes) conditions actuelles, où prédomine un deuxième effet de serre dans lequel le CO_2 est le principal facteur. Certains vont même jusqu'à affirmer que l'effet de serre décrit ci-haut n'a commencé qu'il n'y a que quelques centaines de millions d'années, ce qui signifierait que Vénus avait ressemblé à la Terre pendant plusieurs milliards d'années.

La combustion effrénée des comustibles fossiles et le largage massif d'éléments renforçant l'effet de serre dans notre atmosphère pourrait alors servir d'allumette au même processus. Ainsi, les brouillards de vapeur d'eau autour de certaines grandes villes, favorisés par les grands lacs de retenue, élèvent-ils de 2°C en moyenne la température qui y règne par rapport à la campagne environnante.

Et le plus grave, c'est qu'un tel phénomène s'emballe, car il est récurent, c'est-à-dire que sa croissance augmente sa vitesse de croissance. Ainsi plus d'eau dans l'athmosphère élèvera la température ambiante, qui fera évaporer encore plus d'eau....

Vers une deuxième venus?

L'acidité de nos pluies n'aura d'ailleurs bientôt rien à envier aux averses vénusiennes. En effet, le record, obtenu à Wheeling, en Virginie, était obtenu par une giboulée à peine 3 fois plus douce que l'eau d'une batterie d'auto (et 10 fois l'acidité du vinaigre). D'ailleurs, en Europe, de 1950 à 1970, les pluies sont devenues 10 fois plus acides et partout, le pH oscille entre 3 et 4 (pomme = 3, jus de tomate = 4,5), alors qu'un chercheur suédois a établi que certains lacs ont mis 12 000 ans à passer de 7 à 6.

Les différences géologiques entre les deux planètes, à savoir la morne plaine qu'est Vénus (un gigantesque désert plat sur 80% de la surface, selon les données du radar de *Pionneer 12*, satellisé autour de l'astre le 4 décembre 1978) et l'épaisseur de la croute continentale vénusienne, peuvent être facilement expliqués par le magma issu du premier effet de serre et les conditions physiques qui règnent à la surface. D'ailleurs l'activité tectonique sur la deuxième planète du système solaire serait aussi du même ordre de magnitude que sur la Terre (entre la moitié et un tiers de celle de notre planète) si la croute vénusienne n'était pas aussi épaisse. On sait ainsi que certaines zones, comme les régions Beta, Aphrodite et Sappho, sont volcaniques, avec la présence d'éclairs et une méga-éruption volcanique, détectée en 1978 par les sondes Venera, où des débris furent projetés jusqu'à 70 kilomètres d'altitude à travers l'atmosphère ultra-dense (la puissance émise fut estimée à plusieurs fois celle du Krakatoa).

Signalons enfin que juste au dessus des nuages, les conditions atmosphériques sont presque égales (sauf pour ce qui est de la composition atmosphérique) à celle de la Terre au sol, et que le recalibrage des photos en couleur retransmises par les dernières sondes Venera, pour tenir compte de l'exclusive prédominance de la lumière jaune en tant que source d'éclairage (étant donné les nuages), nous donnerait presque un paysage de désert terrestre, pris par temps couvert.

Vénus est aussi l'astre le plus brillant du ciel après le Soleil et la Lune (elle est visible à l'oeil nu en plein jour, et peut projeter des ombres la nuit), car son albédo (la proportion de la lumière solaire incidente réfléchie) atteint 70%. Cela signifie qu'il faut peu de chose pour entretenir les conditions infernales qui y règnent (à peine 4 % des photons solaires atteignent le sol, et c'est d'ailleurs l'atmosphère qui est le plus grand facteur d'absorption).

Vénus est dons un exemple à méditer, car les faits montrent que nous sommes sur la bonne voie pour emprunter son chemin. Evidement, des nuances sont à apporter, car il faudrait plusieurs dizaine de milliers d'années pour faire évaporer toute l'eau des océans (en admettant que toute l'énergie solaire reçue par la Terre soit utilisée à cette fin). Mais le danger présenté par la combinaisor de l'élimination de l'ozone, de la destruction de la biosphère et des pollutions de toute nature, est réel car tous ces phénomènes ont un effet synérgique menant tout droit à l'emballement thermique et à ses conséquences effroyables.

co-ordinating editor Jennifer August
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Contributors
Dan Hogan, Arnie Mooers, Chris Marshall, Tara Patel, Caitlin Huckell, Ita Anderson, Nathalie Ragheb, Marc Nantil, Marc Sokolowski, Rob Macfarlane

Editorial offices: 3480 McTavish, room B-03, Montréal, Québec, H3A 1X9, telephone (514) 398-6784/85 Business Manager: Kim Penney, room B-17, telephone (514) 398-6791 Advertising Managers: Caroline Elie, Boris Shedov, room B-17, telephone (514) 398-6790 Advertising Layout and Design: Mike Sportza

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... more talk

continued from page 1

modelling studies, chimpanzees should be able to produce many human sounds, yet all attempts to teach them have failed.

The key to understanding lies higher than the larynx. Liebermann looks to the brain.

Over the past half billion years, the brains of vertebrates have not changed their basic organisation, with a hindbrain, midbrain and forebrain. Higher order nervous system functions are controlled by the forebrain or the cerebrum. As hominids evolved into homo sapiens, the cerebrums grew. The cerebrum of homo sapiens is the size of a grapefruit, whereas the ancient fish vertebrates had pea-sized cerebrums.

With this evolution in brain size came sensory and motor sophistication. Much of this activity takes place in the outer cerebral cortex, including the capability of these systems to function automatically. Thus, we do not have to think about how to coordinate our muscles in order to walk.

The human speech control centre, or Broca's area, is located in this region. Apes have a precursor to Broca's area that also controls the motor activity of the throat and mouth.

Liebenmann believes that early humans needed their intelligence and ability to communicate to survive. The evolutionary development of the brain and the vocal tract together yielded language.

This evolution can be seen by fossil skull shape. Neanderthal humans living 40 thousand years ago were anatomically similar to modern humans but could not speak. They probably died out because they could not compete with more modern humans who were adapted for language.

Syntax are the rules governing sound in order to produce meaning. Liebermann stresses that syntax evolved with the motor control of speech during brain development.

The experience of the aged, people with Parkinson's disease or damage to Broca's area, support this theory. In all three cases, not only is speech slower, but so is comprehension. Speech impairment and understanding are coupled to the same neural mechanism.

Although Liebermann's ideas seem directly oppossed to those of Noam Chomsky, perhaps it is only a question of degree. The distance between human and animal communication is so great that they can appear completely unrelated.

The mystery of speech may never be solved, but people are sure to be talking about it for a long time.

LETTERS

To the Daily,

We really appreciate the dedication and the efforts that you put into making this newspaper a serious and well-informed source of scientific news. Your paper once again proves that the student body is genuinely interested in the latest medical, social, environmental and technical breakthroughs which make the world a better place to live and die in.

We believe though that there is one major issue that hasn't been raised yet in your paper. It is an issue of capital importance as it will affect each and every one of the 5 billion human beings that populate this marvellous planet of ours. I think that by now you have guessed what this vital piece of news is: The imminent invasion and destruction of our dear Earth by bug-eyed, slimy, mucus-dripping tentacular beings from Outer Space (from Aurigae IV to be precise.)

Some of us are already being transformed into immoral, unethical, unpatriotic Things (who don't even brush their teeth.) You're probably asking yourselves: "How do these guys know all this?" The answer is obvious: We were invaded ourselves by those godless creatures (whose names are unspeakable by human vocal cords) but just managed to break free by ingesting several cans of mayonnaise (they can't stand anything that has to do with eggs as they are born from pure energy and consider any other birth processes utterly unpure.) We escaped, but not without snatching some crucial information: They plan to land their SpaceSquid, the mother-ship, right here in the Molson Stadium. By some amazing cosmic fluke, their intergalactic cephalopodial ship fits snuggly into our Beloved Bowl (which makes sense, since the surface of play is made of ASTROturf.)

Now this is all the info we could grab from the aliens as our minds melted into one hideous mutant assembly of solar and aurigaean neurons. We just thought we'd tell you so you can investigate further and bring the whole affair out in the open. After all, the world as we know it depends on it, and we'd hate to see the Redmen's new turf ruined.

Until then, eat lots of eggs and "Mayo force be with you!!!"

Marc Nantel, M.Sc. 2

CLASSIFIEDS

Ads may be placed through the *Daily* business office, room B-17, Union Building, 9h00 - 15h00. Deadline is 14h00 two weekdays prior to date of publication.

McGill students: $3.00 per day; $7.00 for 3 consecutive days. McGill Faculty and Staff: $4.00 per day; $2.00 per day for more than 3 consecutive days. All others: $4.50 per day. There is a 25 word limit. There will be a charge of 25¢ for each word over the limit. Boxed ads are available at $4.00 per ad per day - no discounts on boxing. *EXACT CHANGE ONLY PLEASE.*

The *Daily* assumes no financial responsibility for errors, or damage due to errors. Ad will re-appear free of charge upon request if information is incorrect due to our error. The *Daily* reserves the right not to print any classified ad.

341 - APTS., ROOMS, HOUSING

3 1/2 to Sublet, downtown. Included: fridge, stove, locker, wall to wall carpet, indoor parking,. Sherbrooke & St. Mathieu, near Guy metro. (10 minute walk from McGill) $435/mo. Call Caroline from 9:30 to 5:00 at 398-6790/6791. After 5:00 pm at 933-0078.

Brand new 8 1/2 to share. Two minutes from McGill at Durocher and Milton. Bright, spacious - all the luxuries. Anyone eligible. Call Lisi 935-1479. Hurry!

Female roommate wanted to share a bright, clean apartment with laundry facilities, 7 minutes from campus. available immediately. $275 a month. Please phone 288-7828.

Amazing 3 1/2 October free! 3445 Hutchinson. $450/mo. including utilities. New building, modern kitchen, bright, livingroom and bedroom. Available Oct. 1st. 284-5290.

Sublet bright cute 31/2, great location, interesting layout e.g not your basic box, available immediately. 636-4744 (mornings).

Apartment to share - 3 bedrooms, 2 balconies, fridge + stove, washer + dryer - 185/Month. Only ten minutes by bus to downtown. If interested please contact Jose at 488-4642.

BEAUTIFUL 4 1/2 TO SHARE. Big, sunny, fabulous location, 30 seconds to Villa Maria metro, 24 bus. Good shopping. Quiet, non-smoking female please. Cathy, 481-2087 after 6 pm.

4 1/2 to share, Cote-des-Neiges, the new ghetto. $285/mo., including heat. 274-6664.

350 - JOBS

Bartenders - Get yourself a very lucrative part-time job. The master school of bartending offers training courses and placement service. 2021 Peel Street (Peel Metro). 849-2828. (Student Discounts)

Talk your way into money as a teleconferencing operator - no experience necessary. Bilingual required, outgoing personality preferred. PT/FT shifts. Call Yvanna: 935-4733.

Part-time work; flexible hours. Direct telemarketing for a Financial Service Company (Insurance). $6.00 per hour. Please call after 6 p.m. at 738-0255.

Computer typist with access to "Framework" word processing system required to type revised, book length manuscript. Prof. W. Wees, 398-6590.

352 - HELP WANTED

Students: Gourmet food store on St. Denis requires weekend supervisor: call Fred 842-4169.

Spring Break Tour Promoter-Escort. Energetic person (M/F) to take sign-ups for our Florida tours. We furnish all materials for a successful promotion. Good Pay and Fun. Call Campus Marketing at 1-800-423-5264.

Automatic parking: looking for part-time/full-time cashier, M/F $5/hour, responsible. Call 282-1080.

Paid Election Jobs - 18 enumerators needed to work in upcoming federal election. Hours: 6 pm - 9 pm. Call Ben before Friday; 483-5752.

354 - TYPING SERVICES

Success to all students. Theses, Term, papers, Resumés, 19 years of experience, Rapid Service. 7 days a week. $1.50 double spaced. IBM. On McGill campus, Peel St., CALL Paulette Vegneault 288-9638.

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361 - ARTICLES FOR SALE

Vancouver for thanksgiving. One way ticket, female. Montreal - Vancouver, Oct. 7 evening. $180 OBO. 289-8690, leave message.

Leather Jacket! Size 36 - excellent quality and condition (Wilson's)! - best offer - call Nigel 842-2538 after 6 p.m.

Typewriter - Smith-Corona, electric, correctable, cartridge ribbon, $110. Car stereo - Pioneer component, auto-reverse cassette, 120W and 40W amps, 4 3-way speakers, bi-amp balancer/equalizer $640. 849-0390.

"Mulroney - Just say no!" Make your voice heard with this message on a silk screened 50/50 Penman's T. Features B+W picture of Mulroney with message in red. Only $11.95. Call Nita at 284-5683 to place your order.

370 LOST AND FOUND

LOST: a RED wallet with WHITE STRIPES, in the Arts Bldg. (RM 270). You can keep the money and wallet but PLEASE return all the cards. It's such a pain to have them all replaced. Call Isabelle Clément at 342-0198 or 739-3714 or 398-6784/6785 or drop the wallet at the McGill Daily Office - Union B-03. NO QUESTIONS ASKED.

Case of beer (or other reward) in exchange for the return of my Queen's Engineering '90 jacket taken from Douglas Hall Saturday night after the game. Call 934-3176.

Pencil Case FOUND. Sept. 30, Otto Mass. Name on it - S. Gratton. Call Henri - 259-5211.

LOST black Levi's Jean Jacket. Extraordinary sentimental value. If found call Kevin 939-5713.

374 - PERSONAL

Need Information? Feeling lonely? Just want to chat? Then call McGill Nightline! We are students talking to students. 398-6246, Monday to Friday, 9 p.m. to 3 a.m. Anonymous and confidential.

"Oh baby since I met you, there's none other when I'm down and blue. Where'd I be without my McGill Nightline?" 398-6246, 6 pm-3 am every night.

385 - NOTICES

ANIMAL RIGHTS! A new group called META - McGill for the Ethical Treatment of Animals is looking for members. Call Steve at 272-5064.

Hockey. Goaltender and several players wanted for intramural "13" team. Call Adrian 398-5063.

Alpine Ski Team. Dryland Training. Gates 4 times a week. World Cup Coach. Intensive training camp. 398-6826 Rm. 433, Stud - Union Bldg. Check it out!!

Starting October 1st McGill Nightline will be on extended play. From 6 pm - 3 am seven nights a week call 398-6246.

Celebrate thanksgiving on Mount-Royal. Informal, eucamenical service led by St. Martha's in-the-Basement. Sunday, Oct. 9th. Meet at 3521 University 10:30 a.m. Everyone Welcome! 398-4104.

U1 Physics students! Need to get involved to enjoy your first year at McGill. Choose the good U1Rep: Choose Xavier Bonnin.

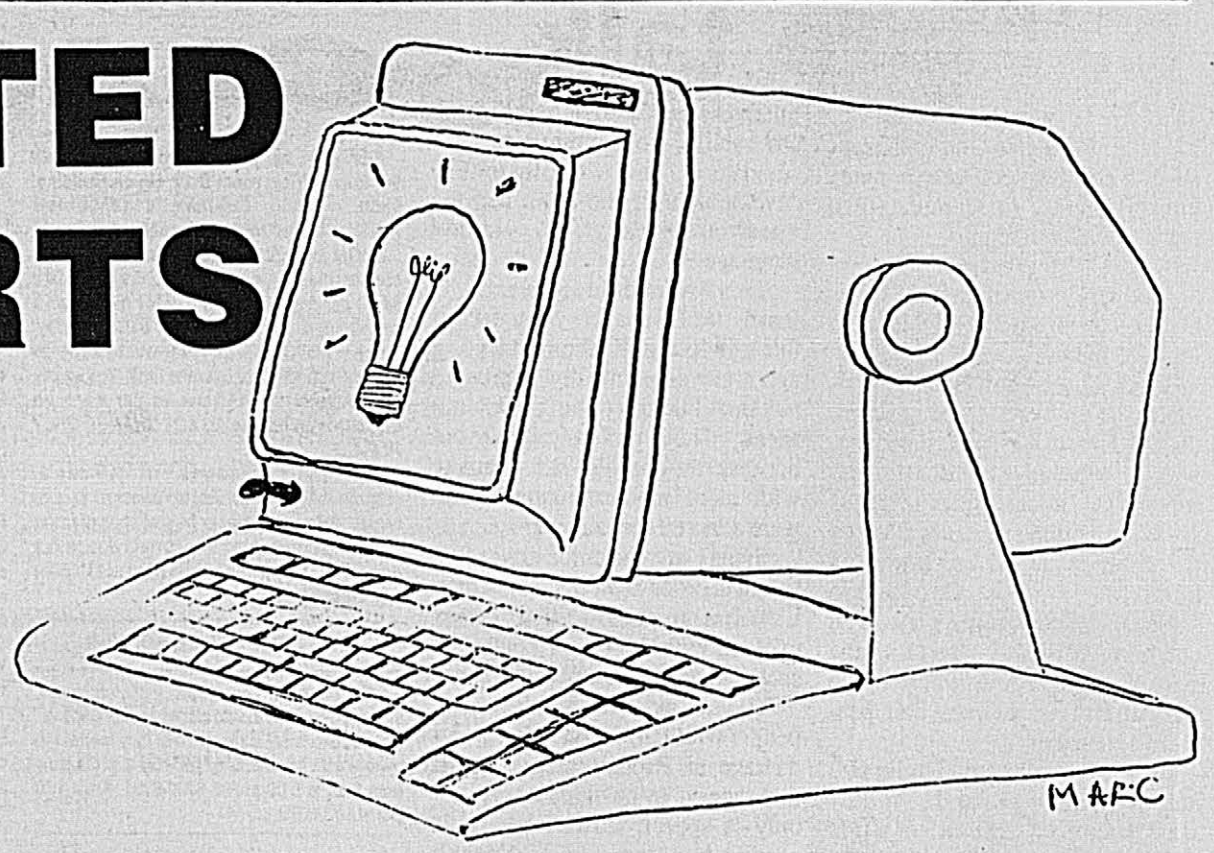
Folk Music Society weekly gatherings. Bring voice, love of folk music, and instrument if owned. Tuesdays, 19:30, Yellow Door, 3625 Aylmer. 284-7828.

HOCKEY: Arts student wishing to join/form intramural team. Call Kurt after 7 p.m. tonight at 284-6374.

Bible Study Thursday, October 6th, 4:30 Newman Center, 3484 Peel. 398-4104, Rev. Roberta Clare.

Actors In 20's wanted for advanced student film. Call Joe at 931-3199.

SIMULATED SMARTS



ITA ANDERSON

To the dismay of many diehard technophobes, artificial intelligence has created a new generation of computers capable of simulating human thinking and reasoning.

'Intelligent' systems can be used to investigate natural intelligence and manage tasks that are still too complex for a computer without some degree of intelligence. Developments in this area have left many asking just what the criteria for a thinking machine is.

Alan Turing was one of the pioneers of artificial intelligence. He designed the Turing test to answer the question "Can machines think?"

The players are a man, a woman and an anonymous interrogator, linked only by teletype. The task of the interrogator is to discover the gender of each player by asking them questions. The male player tries to prevent the interrogator from reaching the correct conclusion, while the female player tries to aid the interrogator.

Turing proposed that if a computer could replace the male player without significantly altering the interrogator's success rate, then that machine could be said to think.

Artificial intelligence has many applications, which share common problems. The system has to communciate with the environment as naturally as possible, and any knowledge must be stored efficiently. This presents problems of knowledge representation and acquisition.

Knowledge representation theory deals with an how the human brain represents information. Many of the methods of information association used in the human mind do not lend themselves to computerization. Unconscious knowledge, understandably, is difficult to reproduce on a computer.

Predicate calculus is the language used in artificial intelligence to represent the real world, its states, situations and goals. For instance, the concept "Carol's parents are not married" can be represented as MARRIED (father [Carol], mother [Carol]) = F. This is a well termed formula, and its value is false. Predicate calculus syntax allows these formulas to be connected, evaluated and resolved by an artificial intelligence system.

Not all knowledge lends itself to easy representation in this manner. Intuitive common sense or uncertain knowledge are some problems in artificial intelligence for which predicate calculus is inadequate—more complex logical formalisms are needed.

Knowledge acquisition tackles the difficult and tedious task of formalizing rules and facts into a form which the computer can understand and use.

One method is to teach computers with advanced natural language processing. Another way is to edit the facts and rules in the system's knowledge base. One can even allow the system to learn from its own experiences.

Designing an artificial intelligence system that can learn has many levels of complexity. On a basic level, changing or adding a fact or rule can be termed a learning process. On a more advanced level, learning is through a conversation with an expert or through the system's own modification of its knowledge base.

Adaptive learning techniques are still in the early stages of development. A system can learn if its own computations can be used the same way it uses the data originally provided by the programmer.

An important concept for the artificial mind is that of the analogy. The system needs to be able to recognize the situations in which the new information is both applicable and valuable.

As natural language conversion becomes more advanced, the ease with which an expert in any particular field can alter or add to the data will increase. However, this increased ability may also depend on a degree of self knowledge that is difficult to give a computer.

Intelligence, obviously, requires some degree of self-awareness. The questions "How many books are on the table?" and "How many people live in Ottawa" are of the same type, but the answers are found differently. The first uses procedural knowledge—one can simply count the books. The second requires declarative knowledge—one either doesn't know or answers "about 304 000".

Metaknowledge, on the other hand, is knowledge about how knowledge is organized. In humans, metaknowledge is usually unconscious. Meta-reasoning can help to solve many problems. For instance, one would know if the Pope were shorter than five feet, so it is safe to assume that he isn't. This principle can even be applied to equation sloving.

Intelligent data retrieval systems require the ability to interpret commands posed in a natural language, deductive reasoning skills and 'common knowledge'. For example, to equate the question "Who are Jane Doe's parents" with "Of which two people is Jane Doe the daughter?" requires interpretation, knowledge about family relationships, and the hard facts.

Theorem proving involves a combination of judgement and intuitive guessing. The system needs a sense of direction so that only relevant paths are explored.

Two problem solving methods are look-ahead and problem reduction.

Look-ahead involves scanning all the possible options up to a certain number of steps ahead and choosing the most promising. This is often used in chess programs. The problem reduction method then splits the problems into subproblems, each of which has its own subgoal.

This process can be repeated again and again until the smallest subgoals are trivial. Problem reduction tends to result in a long term strategy, whereas look-ahead picks what seems to be the best option for the short term.

A theorum proving system by Gelernter (1960) was seen by some as a spark of genius. His program came up with an elegantly simple version of the proof that the base angles in an isoceles triangle are equal.

Proponents of the system claimed that this was evidence of genius and therefore intelligence, but it is hard to determine how much of the proof was an extension of Gelernter's ideas and programming, and how much was an original product of the system. As the system has yet to come up again with any more such ingenious proofs, a conclusion is hard to reach.

Artificial intelligence, like most fields of computer science and psychology, is a rapidly expanding and evolving area of study. Whether or not the research proves to be suitable for widespread practical use, the information garnered about the human mind will, no doubt, be both enlightening and valuable.

...doin' Dewdney

continued from page 6

Several of his articles deal specifically with computer simulations. In addition to those mentioned above, Dewdney describes the relationship between a predator and its prey, and demonstrates how 'survival of the fittest' works in an ideal world. Again, each simulation is presented in enough detail to understand it without the need for a terminal, while still providing enough programming hints for those who want the hands-on experience.

For those who do not yet want to buy the book itself, Dewdney is available in smaller doses on the back page of each issue of *Scientific American*. His article in April 1988 is an excellent introduction to his style, knowledge and sense of humour. The article describes a mythical ancient civilization which created a digital computer using only ropes and pulleys. Dewdney explains how such a computer can be reproduced at home, if enough string is available.

Dewdney has also written a book called *Planiverse*, in which he describes the evolution of life in a two-dimensional universe—in this case, not surprisingly, a computer screen. Dealing with everything from anatomical necessities to social restrictions in 2-D, he again challenges his readers to think, regardless of scientific background.

Computer junkie or otherwise, every active mind would benefit from a wander through one of Dewdney's many universes.

Scientific syphroseny is happenin' down at the Daily tomorrow at 17h00 in Union B-03.